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RESEARCH ARTICLE

Supplemental Insurance and Racial Health Disparities under Medicare Part B

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Objective. To assess the impact of preferences, socioeconomic status (SES), and supplemental insurance (SI) on racial/ethnic disparities in the probability and use of services at physicians' offices, hospitals, and emergency departments among Medicare beneficiaries enrolled in Part B.

Research Design and Subjects. This study includes black and white beneficiaries from the 2009–2011 panel of the Medicare Current Beneficiary Survey who were enrolled in Medicare Part B. Logit and negative binomial multivariate regression analysis were used in conjunction with rank-and-replace methods to determine factors influencing utilization and black–white utilization disparities.

Principal Findings. Among Part B beneficiaries, significant disparities exist for each studied service. Examining contributing factors, 12–19 percent of the black–white health-adjusted difference in the probability of use is explained by differences in SES, whereas differences in the distribution of SI accounts for 20 percent or more. For volume, SES is found to account for 2–11 percent of differences with SI making up another 9–10 percent.

Conclusions. A substantial portion of the difference in black–white beneficiary use of outpatient services is due to SI. Policies aimed at increasing coverage are likely to increase the probability of visits with modest increases in volume.

Key Words. Racial/ethnic differences in health and health care, health economics, access/demand/utilization of services, Medicare

Racial and ethnic disparities in health care utilization (hereafter "disparities") are defined as population differences in the use of health care services between whites and other racial/ethnic groups that are not due to differences in the health status or preferences of the underlying populations (Smedley et al. 2002). There is widespread agreement that health insurance plays a pivotal role in disparities with minorities having historically lower levels of health insurance coverage (Hargraves and Hadley 2003). However, Medicare eligibility at age 65 provides many previously uninsured minorities with coverage leading to increased utilization and expenditures (Decker and Rapaport 2002; Lichtenberg 2002; McWilliams et al. 2003, 2007, 2009; Decker 2005; Card,

Dobkin, and Maestas 2008). Despite Medicare's increase in use, and even with the same level of basic coverage, racial differences in use persist. Comparing traditional Medicare and Medicare HMO plans, Balsa, Cao, and McGuire (2007) found that black Medicare beneficiaries were significantly less likely to visit a medical provider. Given racial differences in socioeconomic status (SES), beneficiary costs (premium contributions, deductibles, and coinsurance) may be unaffordable to minorities. In addition, long-standing behaviors and preferences toward use developed in periods without insurance may hinder those newly enrolled from fully utilizing available health care resources (Decker et al. 2012).

Contributing to differences in cost sharing are racial/ethnic differences in supplemental insurance (SI) coverage. Medicare permits beneficiaries to enroll in additional insurance plans that cover more than basic Medicare. These SI plans are often provided to employees at retirement through employer-sponsored insurance or are purchased directly by the beneficiary through Medicare-regulated Medigap policies. Minorities are historically less likely to have SI (Eichner and Vladeck *2005*).

Historically, those with Medigap consume more medical services and have greater levels of program costs. For example, Medicare Part B is the component of Medicare that covers outpatient hospital and physician office visits. Beneficiaries enrolled in Part B are responsible for 20 percent of the physician's bill (the coinsurance rate) with Medicare paying the remaining 80 percent. Most Medigap policies cover the beneficiary's entire 20 percent share, reducing the beneficiary's out-of-pocket costs to zero, increasing the consumption of medical services. This increased utilization is typically referred to as moral hazard, given that the insurance plan directly alters the probability/volume of service utilization. In addition, Medigap enrollment is subject to adverse selection. Individuals in poor health or with preferences for greater use of health care services may choose a Medigap policy to reduce their out-of-pocket contribution for services that they would have consumed regardless of their coverage level.

Empirical work examining the effects of cost sharing has confirmed the existence of moral hazard as found in the seminal Rand Health Insurance Experiment (Manning et al. 1987; Aron-Dine, Einav, and Finkelstein 2013), among Medicare beneficiaries (Chandra, Gruber, and McKnight 2010), and

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among low-income public insurance recipients (Chandra, Gruber, and McKnight 2014). Empirical studies evaluating moral hazard and adverse selection under Medigap typically find evidence of both (Wolfe and Goddeeris 1991; Cartwright, Hu, and Huang 1992; Fang, Keane, and Silverman 2008; Cabral and Mahoney 2014), implying that researchers who do not isolate these two effects may introduce bias in racial/ethnic disparity estimates. Given that minorities are less likely to have SI, it is likely that some of the observed differences in utilization between racial/ethnic groups are due to relative differences in cost sharing (moral hazard) and should be included within conventional definitions of disparities. However, those with preferences toward greater use of services are more likely to purchase SI policies. As this portion of utilization is due to either unobserved differences in health or preferences, in keeping with the IOM's definition of disparities, it should be removed from disparities estimates. However, caution in the interpretation of these estimates is necessary, given the complex/interactive relationship between moral hazard and adverse selection.[1] In addition, preferences may reflect not only personal tastes but also mistrust in health care professionals caused by personal and community experiences with inferior care and segregation (IOM, p. 131). Furthermore, resource constraints may restrict an individual's choice/ability to purchase SI.

Given racial differences in both SES and SI and an established literature that documents the effects of SI on utilization, this study hypothesizes that SI is a key contributor and potential mediating factor in utilization disparities. The data and methods used for the analysis are discussed below.

METHODS

Study Design and Sampling

To evaluate the role of SI and SES on disparities, this study uses the 2009–2011 panel of the Medicare Current Beneficiary Survey (MCBS), a nationally representative sample of the Medicare population. The MCBS is supplemented with beneficiary claims data, area characteristics from the 2013 Area Health Resources File, and a Part B payment generosity measure adapted from Hadley et al. (2009) and Brunt (2015).

The unit of observation is the Medicare Part B beneficiary. Given that the MCBS is a nonrandom sample, the analysis includes only those with positive sampling weights observed across 2009–2011 ($N = 16{,}944$).[2] To maintain a greater degree of homogeneity, beneficiaries are restricted to those who

across each sample year (i) remained alive ($N = 16,897$), (ii) maintained enrollment in Part B with no Medicare HMO enrollment ($N = 11,931$), (iii) who did not have a hospice event ($N = 11,782$), (iv) whose administrative files indicate that they were black or white ($N = 11,243$),[3] and (v) whose residence was within the contiguous United States ($N = 11,188$). Lemieux, Chovan, and Heath (2008) found that utilization of services by veterans at VA military facilities is not contained in Medicare claims data, leading to inaccurate accounts of medical care use and distorting estimates of Medigap's effects. To account for this potential bias, the sample includes only individuals who report never having served in the U.S. Armed Forces ($N = 8,556$). Given that Medicare acts as a secondary payer in instances where a beneficiary receives insurance through their current employer, beneficiaries with current employer coverage are excluded from the analysis ($N = 8,256$). Medicaid dual eligibility indicates low income and potentially poor health, given the disability qualifying criterion for Medicare enrollment. In addition, Medicare beneficiaries with severe health events may spend down excess income and as a result become Medicaid dual eligible, implying potential endogeneity between utilization and dual eligibility status. To eliminate these complications from the analysis, this study includes only those without Medicaid dual enrollment across the observation year ($N = 6,264$). Furthermore, observations are restricted to those with valid and nonmissing: health status ($N = 5,909$), health care preferences ($N = 5,816$), income, marital status, and education ($N = 5,033$), and with valid insurance and Part B Payment generosity data ($N = 4,828$).

Dependent Variables

Descriptions and summary statistics for this study's dependent variables are reported in Table 1A. They include commonly used measures of utilization of care that are generated from beneficiary claims data, namely, the annual probability and volume of services (unconditional on positive utilization) for each of the following visit types: (i) primary care physician (PCP) office visits, (ii) specialist office visits, (iii) physician office visits (PCP or specialist), (iv) outpatient hospital visits (not associated with an inpatient hospitalization), and (v) emergency room (ER) visits.

After removing all claims denied by Medicare, physician office visits are identified as those with a place of service indicator for a physician's office. PCP visits are identified as physician office visits to general practitioners, family practitioners, internists, OBGYNs, pediatricians, geriatricians, nurse practitioners, physicians' assistants, and certified clinical nurse specialists based on

Table 1: Variable Descriptions and Summary Statistics

Variable	*Description*	*Black (N = 437) Mean/Pro. (SE)*	*White (N = 4391) Mean/Pro. (SE)*	*Difference Mean/Pro. (SE)*
(A) Dependent Variables				
ppcp	1 if had a primary care physician office visit during the year	0.684 (0.033)	0.814 (0.011)	−0.130 (0.034)
pnpcp	1 if had a specialist physician office visit during the year	0.575 (0.032)	0.781 (0.010)	−0.206 (0.034)
pofficevisit	1 if had a physician office visit during the year	0.770 (0.032)	0.921 (0.007)	−0.151 (0.032)
phosvisit	1 if had a hospital outpatient visit during the year	0.205 (0.034)	0.160 (0.010)	0.044 (0.033)
pervisit	1 if had an emergency room visit during the year	0.308 (0.022)	0.244 (0.008)	0.063 (0.023)
tpcp	Unconditional annual volume of primary care physician office visits	3.307 (0.251)	4.309 (0.135)	−1.002 (0.285)
tnpcp	Unconditional annual volume of specialist physician office visits	3.026 (0.298)	5.543 (0.163)	−2.517 (0.311)
tofficevisit	Unconditional annual volume of physician office visits	6.333 (0.429)	9.852 (0.227)	−3.518 (0.472)
thospitalvisit	Unconditional annual volume of hospital outpatient visits	0.780 (0.174)	0.477 (0.040)	0.303 (0.170)
tervisit	Unconditional annual volume of emergency room visits	1.218 (0.221)	0.733 (0.032)	0.486 (0.225)
(B) Health Status Variables				
Excellent health	1 if beneficiary reported having excellent health compared to others their own age	0.101 (0.018)	0.169 (0.009)	−0.068 (0.021)
Very good health	1 if beneficiary reported having very good health compared to others their own age	0.268 (0.027)	0.331 (0.010)	−0.063 (0.030)
Good health	1 if beneficiary reported having good health compared to others their own age	0.368 (0.027)	0.297 (0.009)	0.071 (0.028)
Fair health	1 if beneficiary reported having fair health compared to others their own age	0.190 (0.022)	0.146 (0.009)	0.045 (0.025)
Poor health (omitted)	1 if beneficiary reported having poor health compared to others their own age	0.072 (0.017)	0.057 (0.006)	0.015 (0.018)
Agel65	1 if age less than 65	0.300 (0.031)	0.113 (0.009)	0.187 (0.032)
Age6571	1 if age 65–71	0.287 (0.034)	0.301 (0.010)	−0.014 (0.037)

continued

Table 1. *Continued*

Variable	*Description*	*Black (N = 437) Mean/Pro. (SE)*	*White (N = 4391) Mean/Pro. (SE)*	*Difference Mean/Pro. (SE)*
Age7277	1 if age 72–77	0.170 (0.026)	0.257 (0.008)	−0.087 (0.027)
Age7883	1 if age 78–83	0.179 (0.026)	0.182 (0.008)	−0.003 (0.026)
Age84+ (omitted)	1 if age 84 or older	0.064 (0.016)	0.147 (0.007)	−0.083 (0.018)
Heartatck	1 if ever told had heart attack/myocardial infarct	0.083 (0.023)	0.114 (0.007)	−0.031 (0.024)
Stroke	1 if ever told had stroke	0.125 (0.025)	0.085 (0.006)	0.040 (0.025)
Cancer	1 if ever told had non-skin cancer	0.128 (0.028)	0.209 (0.010)	−0.080 (0.029)
Diabetes	1 if ever told had diabetes	0.371 (0.036)	0.209 (0.011)	0.161 (0.038)
Highbp	1 if ever told that have high blood pressure	0.800 (0.031)	0.681 (0.012)	0.119 (0.034)
Iadlprob	1 if instrumental activities of daily living problems with paying bills, heavy housework, light housework, preparing meals, shopping, or using the telephone due to health problems	0.135 (0.023)	0.132 (0.007)	0.003 (0.023)
Male	1 if beneficiary is male	0.356 (0.032)	0.258 (0.009)	0.098 (0.034)
Smoker	1 if beneficiary is a current smoker	0.209 (0.028)	0.099 (0.008)	0.109 (0.029)
Worry	1 if beneficiary worries about health more than others of same age	0.270 (0.024)	0.182 (0.008)	0.088 (0.027)
(C) Preference Variables				
Avoid	1 if beneficiary would do almost anything to avoid going to the doctor	0.321 (0.025)	0.258 (0.012)	0.063 (0.026)
(D) Socioeconomic Status Variables				
Incomel15 (omitted)	1 if annual income is less than $15,000	0.381 (0.036)	0.176 (0.009)	0.205 (0.037)
Income1524	1 if annual income is $15,000–$24,999	0.278 (0.033)	0.207 (0.008)	0.072 (0.034)
Income2540	1 if annual income is $25,000–$39,999	0.215 (0.029)	0.265 (0.010)	−0.050 (0.030)
Incomeg40	1 if annual income is equal to or greater than $40,000	0.126 (0.023)	0.353 (0.010)	−0.227 (0.025)
College	1 if beneficiary is college educated	0.211 (0.034)	0.329 (0.014)	−0.118 (0.038)
High school	1 if beneficiary is high school educated	0.524 (0.039)	0.485 (0.014)	0.039 (0.042)

continued

Table 1. *Continued*

Variable	*Description*	*Black (N = 437) Mean/Pro. (SE)*	*White (N = 4391) Mean/Pro. (SE)*	*Difference Mean/Pro. (SE)*
Less than high school (omitted)	1 if beneficiary has less than high school education	0.265 (0.027)	0.186 (0.011)	0.079 (0.029)
(E) Insurance Status Variables				
Part B only (omitted)	1 if only enrolled in Medicare Part B	0.599 (0.036)	0.285 (0.013)	0.314 (0.039)
SI	1 if enrolled in Medigap or employer-sponsored retiree insurance which covers some doctor/laboratory visit costs and Medicare Part B	0.401 (0.036)	0.715 (0.013)	−0.314 (0.039)
SI contribution	1 if SI=1 and beneficiary-contributed dollars toward SI	0.255 (0.026)	0.589 (0.014)	−0.334 (0.032)

Notes. All estimates are survey weighted to account for complex sample design. Unreported control variables include beneficiary marital status, county population density, county percentage of the population in poverty, county HPSA designation, 2003 rural–urban continuum controls, regional controls, AMPGI, and the year of observation.

the provider's specialty code. Specialist office visits are defined as office visits to physicians' offices that are not typically associated with primary care.[4] Hospital visits are identified as outpatient visits with a place of service identifier for an inpatient or outpatient hospital.[5] ER visits are identified as Part B visits with a place of service identifier designating the ER.

Explanatory Variables

This study controls for a number of individual and area characteristics that may influence health care utilization. Descriptions and summary statistics for each of these variables are provided in Table 1B–D. To control for health status, this study includes categorical variables for self-reported health compared to others of the same age (i.e., excellent, very good, fair, or poor health), the age range of the beneficiary, whether the beneficiary has a previous history of morbidities (i.e., heart attack, stroke, non-skin cancer, diabetes, high blood pressure), whether the beneficiary reports activities of daily living problems, beneficiary gender, and whether the beneficiary is a smoker. In addition, the study includes the variable "worry" that indicates whether the beneficiary "worries about their health more than others of the same age." Conditional on other health status variables, "worry" provides a measure of the degree to which the beneficiary thinks about their health, potentially influencing their desire for treatment. However, we cannot rule out a relationship between worry and unobserved health status, implying that this measure could be regarded as a health status variable.

Preferences for use are accounted for in each model through the variable "avoid" indicating whether the beneficiary "will do almost anything to avoid going to the doctor." This variable can be interpreted as a pure preference parameter that may be influenced by a number of factors, including personal tastes, implying its inclusion in disparities estimates. However, "avoid" may be influenced by personal/community experiences with health care providers, creating ambiguity in the appropriateness of its inclusion in disparities estimates.

To control for SES, categorical variables are included for annual income (i.e., income <\$15,000, \$15,000 to \$24,999, \$25,000 to \$39,999, and income ≥\$40,000) and the education level of the beneficiary (less than high school, high school, or college).[6] The primary SI control is a binary variable that is equal to 1 if the beneficiary has SI (through a previous employer or independently purchased) that covers some doctor/laboratory visit costs.

This study controls for a number of area characteristics that may influence utilization through channels such as access to care. For example, previous researchers have found that legislative restrictions on the geographic adjustment of the fee schedule lead to variation in payment generosity under Medicare Part B; and that this variation in payment generosity influences physician acceptance of new Medicare patients (Brunt and Jensen 2013, 2014a) as well as satisfaction with access to care (Brunt and Jensen 2014b). To control for differences in access to care caused by payment generosity, a generosity measure adapted from Hadley et al. (2009) and Brunt (2015) called the Average Medicare Payment Generosity Index (AMPGI) is included in each model.[7] Also included are controls for county-level Health Professional Shortage Area (HPSA) designation, and categorical controls for census regions to isolate regional variation in access to care. As more than 88 percent of the nation's black population inhabits metropolitan areas (Environmental Systems Research Institute 2012), it is important to isolate racial/ethnic effects from those specifically associated with urbanicity. To control for urbanicity, categorical controls for the county's 2003 rural/urban continuum code and a continuous measure of population density are included in the analysis.

Regression Model

To identify the impact of race, SES, and SI on health care utilization, this study estimates the following generalized linear model for each health care utilization measure (U) for individual i, in MSA/non-MSA j, and in county k:

$$g\{E(U_i)\} = \beta_0 + \beta_1 \text{Black}_i + \mathbf{H_i\beta_2} + \beta_3 \text{Avoid} + \mathbf{S_i\beta_4} + \beta_5 \text{SI}_i + \mathbf{INDC_i\beta_6} + \mathbf{CNTYC_k\beta_7} + \mathbf{MSAC_j\beta_8} + \epsilon \quad (1)$$

where $U \sim$ Negative Binomial with $g\{\} = ln\{\}$ for count variables, and $U \sim$ Bernoulli with $g\{\}$ = the logit function for binary variables. Under this model, Black represents a binary control equal to 1 if the beneficiary is African American, the vector **H** represents a group of variables for beneficiary health, Avoid represent the previously described preference variable, **S** represents a vector of SES variables, SI is a binary indicating whether the beneficiary has SI, and the vectors **INDC**, **CNTYC**, and **MSAC** represent individual, county, and MSA level control variables.

Isolating Adverse Selection from Moral Hazard

Model 1 is somewhat naive in its approach to the isolation of adverse selection from moral hazard. While controlling for some preferences toward use, it is likely that unobserved preferences are correlated with both the self-selection into SI and each of this study's utilization measures. Consequently, the model likely suffers from some endogeneity due to omitted variable bias. To correct for this bias, this study utilizes an element of the MCBS questionnaire that asks the beneficiary if they "paid any or all of the cost for their SI." This permits the dichotomization of SI enrollees into those with and without out-of-pocket costs toward their insurance premiums. Isolating beneficiaries who contributed, this study estimates the following modification to Model 1:

$$g\{E(U_i)\} = \beta_0 + \beta_1 \text{Black}_i + \mathbf{H_i\beta_2} + \beta_3 avoid + \mathbf{S_i\beta_4} + \beta_5 \text{SI}_i + \beta_6 \text{SI cost}_i + \mathbf{INDC_i\beta_7} + \mathbf{CNTYC_k\beta_8} + \mathbf{MSAC_j\beta_9} + \epsilon \quad (2)$$

Beneficiaries who contributed zero dollars toward their SI premiums should not exhibit the same adverse selection effects on utilization expected by contributing policyholders. Thus, the coefficient β_5 reflects a pure moral hazard effect of SI over traditional Part B, and the coefficient β_6 reflects the additional adverse selection effect based on preferences toward use, assuming homogeneity across SI plans.

Identification of Racial Disparities and Contributing Factors

To estimate the magnitude of use disparities, this study follows an empirical definition of disparities similar to Cook et al. (2009). Let the use of services $U = U[H, P, S, I, R]$ be a function of health status variables $[H]$, preference variables $[P]$, SES variables (S), insurance variables $[I]$, and race $[R]$ (which for our purposes is either white $[W]$ or black $[B]$). At a population level, the magnitude of health-adjusted differences (HADs) is measured as the average utilization of services by the factual white beneficiary population subtracted from the average utilization of the counterfactual black beneficiary population with the white distribution of health status:

$$\text{Health Adjusted Difference (HAD)} = \bar{U}_{WBBBB} - \bar{U}_{WWWWW} \quad (3)$$

where

$$\bar{U}_{WWWWW} = \int\int\int\int U(H,P,S,I,R=W) f_{WWWW}(H,P,S,I)\partial H\partial P\partial S\partial I \tag{4}$$

and

$$\bar{U}_{WBBBB} = \int\int\int\int U(H,P,S,I,R=B) f_{WBBB}(H,P,S,I)\partial H\partial P\partial S\partial I \tag{5}$$

with the five subscripts for $\bar{U}$ representing the distinct racial distributions of **H**, **P**, **S**, **I**, and R, respectively. Furthermore, $f_{WWWW}(H,P,S,I)$ represents the joint density of health status and preferences, SES, and insurance for white beneficiaries and $f_{WBBBB}(H,P,S,I)$ represents a counterfactual joint density function of health status for white beneficiaries simultaneous with the observed black beneficiary distributions for preferences, SES, and SI. In addition, the magnitude of IOM definition-based disparities can be measured as:

$$\text{Disparity} = \bar{U}_{WWBBB} - \bar{U}_{WWWWW} \tag{6}$$

where the white distribution of preferences is imputed to black beneficiaries who maintain their currently observed distributions for SES and SI status.

Furthermore, we can examine the difference due to SES by imputing the white distribution of SES to black beneficiaries:

$$\text{SES Adjusted Disparity} = \bar{U}_{WWWBB} - \bar{U}_{WWWWW} \tag{7}$$

and, subsequently, calculate the difference due to SI by imputing the white distribution of insurance to black beneficiaries:

$$\text{SES/Insurance Adjusted Disparity} = \bar{U}_{WWWWB} - \bar{U}_{WWWWW} \tag{8}$$

with counterfactual joint densities similar to those of equation (3).

Given that these counterfactual joint distributions are not directly observable, they must be generated using methods suitable for nonlinear models. To this end, this study uses a "rank-and-replace" method (McGuire et al. 2006; Cook et al. 2009) that matches individuals based on their ranked score for health status, preferences, SES, and insurance. This method generates the counterfactuals by transforms the distribution of attributes for black beneficiaries to that of white beneficiaries through direct assignment and replacement of each vector of attributes. Estimating the generalized linear

model for health care utilization (U) as in equation (1), this study estimates scores for each of the studied attributes:

$$\text{Health Score} = \mathbf{H_i}\widehat{\boldsymbol{\beta_2}}$$

$$\text{Preference Score} = \widehat{\beta_3}\, avoid_i$$

$$\text{SES Score} = \mathbf{S_i}\widehat{\boldsymbol{\beta_4}}$$

$$\text{Insurance Score} = \widehat{\beta_5}\text{SI}_i$$

Each score is then ranked within white and black beneficiary samples and white beneficiary scores are then assigned to black beneficiaries with corresponding ranks to compute each population-level difference.

For equation (2), preferences are further decomposed to account for adverse selection in unobserved health status and preferences for use among those who purchased SI. The adverse selection score among those with SI cost plans is as follows:

$$\text{Adverse Selection Score} = \widehat{\beta_6}\text{SI cost}_i$$

Given that the adverse selection score may reflect some measure of unobserved health status in addition to preferences, it is subjected to the rank-and-replace method through a separate step in an identical method to the health, preference, and other scores. Under these models, the relative difference in the insurance score should reflect only the moral hazard of SI no-cost plans. The next section provides a summary of the data used in the analysis, average partial effects for estimated models, and estimates for racial disparities.

RESULTS

Table 1 provides a summary of the variables used in the analysis stratified by race. Regarding the probability of utilization, black beneficiaries on average have a 68 percent probability of seeing a PCP during the year versus an 81 percent probability for white beneficiaries. Black beneficiaries on average are less likely to see a specialist for an office visit (58 percent vs. 78 percent), less likely to have had any physician office visit (77 percent vs. 92 percent), and are more likely to have had an outpatient hospital visit (21 percent vs. 16 percent) and a trip to the ER (31 percent vs. 24 percent). These probabilities carry through to unconditional volume with black beneficiaries consuming less visits to physician's offices and more visits to hospitals and ERs. Racial

differences in insurance status are striking, with 40 percent of black beneficiaries covered by SI in contrast to 72 percent of white beneficiaries. Black beneficiaries are less likely to report excellent or very good health (37 percent vs. 50 percent), report worrying more about their own health (27 percent vs. 18 percent), and are more likely to avoid going to the doctor (32 percent vs. 26 percent).

Results for Probability and Volume of Visits

Table 2 reports a summary of average discrete effects for key variables of interest estimated in conjunction with logit and negative binomial regression models.[8] For PCP, specialist, and office visits, statistically significant results indicate that black Part B beneficiaries were (10, 13, and 8 percent) less likely to have had a visit, and annually consumed (1.6, 3, and 4.6) fewer respective visits. Partial effects reveal that black beneficiaries were more likely to have had a hospital visit (6 percent) and consumed (0.4) more visits annually. Controlling for other attributes, the estimates show no racial difference in the probability or volume of ER visits.

All estimated models find statistically significant increases in utilization of physician office visits (PCP, specialist, and physician office visits) for those enrolled in SI relative to Part B beneficiaries. SI increases the probability of PCP, specialist, and office visits (by 9–10, 10–13, and 7–9 percent, respectively). It increases each visit type's volume by approximately 0.43–0.53, 1.2, and 1.5–1.7 visits, respectively. For SI cost plans, we only observe statistical significance for the probability of specialist and office visits and find that those in SI cost plans are 4 percent less likely to see a specialist and 3 percent less likely to have a office visit. These results coupled with a lack of statistical significance for the SI cost variable for volume imply little evidence for adverse selection and weak evidence of advantageous selection.

Preferences appear to heavily influence utilization. The average discrete effects imply that those who avoid going to the doctor are 6, 7, 3, and 7 percent less likely to have had a PCP, specialist, office, or hospital visit across the year. In addition, they are found to consume 1, 1.5, 2.5, and 0.3 fewer of each visit type.

Results for Racial Differences and Disparities in Utilization

Table 3 reports estimates for population average black–white health care utilization differences and disparities. Row A of each panel reports the

Table 2: Summary of Average Partial Effects on Probability and Volume of Visits ($N = 4{,}828$)

	PCP		*Specialist*		*Office Visit*		*Hospital*		*ER*	
	(1) amfx (SE)	*(2) amfx (SE)*	*(3) amfx (SE)*	*(4) amfx (SE)*	*(5) amfx (SE)*	*(6) amfx (SE)*	*(5) amfx (SE)*	*(6) amfx (SE)*	*(7) amfx (SE)*	*(8) amfx (SE)*
(A) Logit Regression Results for the Effects on Probability										
Black	−0.096***	−0.097***	−0.126***	−0.129***	−0.081***	−0.083***	0.058*	0.057*	0.022	0.022
	(0.026)	(0.026)	(0.025)	(0.025)	(0.015)	(0.015)	(0.030)	(0.030)	(0.021)	(0.021)
SI	0.088***	0.101***	0.101***	0.134***	0.069***	0.091***	−0.007	0.002	−0.006	−0.006
	(0.017)	(0.023)	(0.020)	(0.028)	(0.013)	(0.015)	(0.016)	(0.022)	(0.016)	(0.023)
SI Contribution	–	−0.016	–	−0.041*	–	−0.027**	–	−0.011		0.000
		(0.022)		(0.021)		(0.011)		(0.018)		(0.020)
Avoid	−0.061***	−0.060***	−0.067***	−0.067***	−0.033***	−0.032***	−0.068***	−0.068***	0.007	0.007
	(0.019)	(0.019)	(0.014)	(0.014)	(0.012)	(0.012)	(0.015)	(0.015)	(0.016)	(0.016)
(B) Negative Binomial Regression Results for the Effects on Volume										
Black	−1.578***	−1.571***	−2.997***	−2.995***	−4.619***	−4.606***	0.414**	0.417**	0.136	0.136
	(0.367)	(0.368)	(0.548)	(0.552)	(0.700)	(0.704)	(0.169)	(0.167)	(0.121)	(0.122)
SI	0.526***	0.427*	1.240***	1.202***	1.716***	1.497***	−0.057	−0.102	−0.097	−0.090
	(0.182)	(0.236)	(0.295)	(0.446)	(0.381)	(0.509)	(0.091)	(0.115)	(0.097)	(0.126)
SI Contribution	–	0.123	–	0.046	–	0.273	–	0.056	–	−0.009
		(0.219)		(0.454)		(0.471)		(0.086)		(0.093)
Avoid	−1.000***	−1.000***	−1.543***	−1.544***	−2.502***	−2.506***	−0.337***	−0.338***	−0.045	−0.045
	(0.221)	(0.221)	(0.293)	(0.292)	(0.434)	(0.432)	(0.079)	(0.078)	(0.079)	(0.080)

Notes. All estimates are survey weighted to account for complex sample design, ***$p < .01$, **$p < .05$, *$p < .1$. Average discrete effects are calculated using Stata's margins command in conjunction with estimates of models 1 and 2. Full results are available upon request.

Table 3: Average Racial Differences in the Probability and Volume of Visits

	Black–White Difference with Imputed White Distribution for Black											
		Preference Variables				PCP	Specialist		Office Visit		Hospital	ER
	Health	Selection	Avoid	SES	Insurance	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(A) Average Difference in Probability												
A. Black–White Difference	No	No	No	No	No	−0.131***	−0.206***	−0.206***	−0.151***	−0.151***	0.044***	0.065***
B. Health-Adjusted Difference	Yes	No	No	No	No	−0.123***	−0.188***	−0.188***	−0.136***	−0.136***	0.045***	0.037**
C. Disparity 1	Yes	Yes	No	No	No	–	–	−0.209***	–	−0.168***	–	–
D. Disparity 2	Yes	Yes	Yes	No	No	−0.118***	−0.182***	−0.204***	−0.132***	−0.165***	0.048***	0.037**
E. SES-Adjusted Disparity	Yes	Yes	Yes	Yes	No	−0.103***	−0.146***	−0.168***	−0.112***	−0.145***	0.054***	0.038**
F. SES-/Insurance-Adjusted Disparity	Yes	Yes	Yes	Yes	Yes	−0.067***	−0.107***	−0.117***	−0.073***	−0.089***	–	–
(B) Average Difference in Volume												
A. Black–White Difference	No	No	No	No	No	−1.078***	−2.576***	–	−3.730***	–	0.449***	0.524***
B. Health-Adjusted Difference	Yes	No	No	No	No	−1.230***	−2.575***	–	−3.871***	–	0.460***	0.316***
C. Disparity 1	Yes	Yes	No	No	No	–	–	–	–	–	–	–
D. Disparity 2	Yes	Yes	Yes	No	No	−1.191***	−2.521***	–	−3.779***	–	0.481***	0.319***
E. SES-Adjusted Disparity	Yes	Yes	Yes	Yes	No	−1.155***	−2.236***	–	−3.427***	–	0.504***	0.324***
F. SES-/Insurance-Adjusted Disparity	Yes	Yes	Yes	Yes	Yes	−1.026***	−2.009***	–	−3.081***	–	–	–
Estimated Model						Model 1	Model 1	Model 2	Model 1	Model 2	Model 1	Model 1

Notes. Each average probability and volume difference measure is calculated using the rank-and-replace method in conjunction with estimated models, ***$p < .01$, **$p < .05$, *$p < .1$.

unadjusted black–white differences for each visit type. To examine the contributing factors to these differences, Rows B–F subsequently adjust the distribution of black health status, preferences (through selection and then avoidance), SES, and insurance to the distribution of white beneficiaries through separate rank-and-replace steps. Given the correlation between SES and insurance, it is left to judgment of the reader to grapple with the interpretation of each estimate.

After adjusting the black distribution of health status to the distribution of whites (Row B), black beneficiaries are 12, 19, and 16 percentage points less likely to consume PCP, specialist, and physician office visits, respectively. On average, they consume 1.2, 2.6, and 3.9 fewer of each visit type than white beneficiaries. For hospital and ER visits, black beneficiaries are approximately 4 and 7 percent more likely have had a visit and consumed 0.3 more visits each year.

Row C (Columns 3 and 5) reports the black–white difference after adjusting the black distribution for selection in models where SI cost was determined to be a statistically significant variable, that is, the probability of specialist and office visits. For these models, adjusting the black distribution of the adverse selection score results in reduced probability of use among black beneficiaries, increasing the magnitude of the black–white differences in the probability of each of these visit type by 2 and 3 percent points relative to the HAD for each visit type.

Row D reports estimates of disparities in use (i.e., the black–white difference after the adjustment of the black distribution for health status and the preference parameter avoid). Adjusting the black distribution of avoid increases average utilization for all services. Relative to the HAD (Row B), these differences in preferences appear to account for around 0.5 percentage points of the difference in the probability of typical office visits and 0.04–0.09 (2–3 percent) of the observed difference in their volume. For hospital visits, the adjustment of avoid results in increased use, widening the positive racial difference, although the effects are overall small in magnitude (0.003 percent for the probability of a visit and by 0.02 for volume).

Rows E and F of each panel report the SES and SES-/Insurance-adjusted disparities. The adjustment of SES and insurance increases utilization for black beneficiaries, mediating disparities for each type of office visit, but it exacerbates the positive disparities for hospital and ER visits. With adjustment of the black beneficiary distribution of SES, we observe 1.5, 3.6, and 2 percentage point reductions (relative to row D) in the disparity for the probability of PCP, specialist, and office visits, with the disparity in volume reduced by 0.04,

0.3, and 0.3 visits per year. These estimates imply that SES explains approximately 12–19 percent of the HAD in the probability and 2–11 percent of the HAD in volume for physician office visits. For hospital and ER visits, the adjustment of black SES status is found to increase utilization, resulting in an increase in the positive disparities for hospital and ER visits, although the magnitudes are relatively small.[9]

The further adjustment of the black beneficiary distribution of insurance (Row F) results in a 3.6 and 3.9 percentage point reduction in the difference for the probability of PCP and specialist/office visits and reduces the difference in volume by 0.13, 0.23, and 0.35 respective visits. SI appears to be a strong mediating factor, given that even after the adjustment of SES, 20–29 percent of the observed disparity in the probability of an office visits and 9–10 percent of the disparity in volume are explained by SI.

Sensitivity Analysis

To ensure the robustness of this study's findings a number of alternative specifications and tests were performed. The first concern is the results robustness to alternative specifications that permit for racially distinct responses to the key variables of interest. Alternative models that permit for racially distinct effects across SI, SES, and preferences produced results of comparable magnitude to the reported models.

The second concern was based on the removal of denied claims for the construction of the dependent variables. If black beneficiaries have greater likelihoods of claim denial, the construction of these variables will exaggerate the magnitude of black–white differences and disparities. Supplementary analysis on the probability and volume of denied claims found no statistical evidence of higher probability or volume of claim denial among black beneficiaries.

The third concern was whether included county/MSA controls adequately account for limitations in access to care for beneficiaries. To determine the sensitivity of estimated models to the included controls, two tests were performed. First, alternative models that exclude any MSA/county control variables were estimated. Second, an additional access to care control variable was included (the percentage of beneficiaries within the beneficiary's MSA who report being satisfied with the "ease with getting to the doctor from where the beneficiary lives"). Each of these alternative models produced results of comparable magnitude and significance to the reported models.

The fourth concern was whether the sampling framework resulted in sample selection bias. For example, lower levels of SES can make black beneficiaries more likely to qualify as Medicaid dual eligibles. Given that dual eligibles were removed from the sample, this has the potential to create sample selection bias. Estimated alternative models that included dual eligibles produced results comparable to that of reported models, implying the generalizable nature of the findings. In addition, the removal of Medicare HMO beneficiaries has the potential to create sample selection bias if racial/ethnic groups are more or less likely to enroll in Medicare HMOs. Estimated multiple regression models on the full sample found no statistical evidence of racial differences in probability of enrollment in Medicare HMO, implying little evidence of sample selection bias based on this restriction.

CONCLUSIONS

The results of this study show the importance of insurance and SES in the determination of racial disparities in use. Medicare Part B beneficiaries covered by SI plans are found to have higher utilization rates consistent with moral hazard, although little evidence of adverse selection is detected. In addition, this study illustrates the importance of controlling for preferences when evaluating health care consumption and utilization. Controlling for health status and insurance, those who indicate that they "avoid going to the doctor at all costs" are statistically less likely to use health care services. The average partial effects for these variables on volume of primary care and physician office visits indicate that this preference parameter *more* than offset the increased use of services implied by SI and illustrate the importance of these characteristics.

This study finds significant differences in the probability and volume of each service studied even after controlling for population differences in health. Examining the root causes for these differences, this study estimates that SES accounts for around 12–19 percent of the disparity in the probability of use, whereas differences in the distribution of SI accounts for 20 percent or more. For volume, these results are less dramatic, with SES accounting for 2–11 percent of observed differences and SI accounting for an additional 9–10 percent.

Policy makers attempting to reduce health disparities in Medicare must remain aware of racial differences in SI status. The relative prevalence of SI among white beneficiaries coupled with evidence of moral hazard among policyholders implies that racial differences in health care costs are a key

contributor to disparities in use. Furthermore, given that SI appears to be a much stronger mediating factor for probability than for volume, policies aimed at uptake of SI among black beneficiaries may improve health without a substantial increase in costs.

Limitations

This study is subject to a number of limitations. First, given that it evaluates beneficiaries across only a 3-year period, it is likely that preferences toward use and even health status have been effected by long-term disparities and periods without insurance. Future research with longer panels is warranted to determine these effects. Second, while this study isolates those with SI and whether the beneficiary financially contributed to their SI, it is not able to identify the specifics attributes of their SI plan. This causes the estimates to implicitly assume homogeneity of SI cost sharing and service coverage. This assumption also implies that black and white beneficiaries who opt for SI will select into the same types of plans. Examining the literature, we find no studies that examine racial differences in SI enrollment type. These limitations warrant future research examining utilization disparities with data sources that differentiates plan attributes such as cost sharing.

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NOTES

1. For example, an individual with limited experience medical care may develop preferences for higher utilization when exposed to low-cost/free insurance, that is, while exercising moral hazard.
2. We observe 5,648 individuals each year for a total of $3 \times 5{,}648 = 16{,}944$ observations.

3. The small Hispanic samples within the MCBS restrict this study's ability to evaluate them independently of black beneficiaries. Given that these groups may face distinct barriers in access, Hispanic beneficiaries were removed from the analysis.
4. These specialties include the following: addiction medicine, allergy/immunology, anesthesiology, cardiology, intensivists, dermatology, emergency medicine, endocrinology, gastroenterology, gynecologist/oncologist, hematology/oncology, infectious disease, interventional pain management, interventional radiology, medical oncology, nephrology, neurology, neuropsychiatry, nuclear medicine, ophthalmology, osteopathic manipulative therapy, otolaryngology, pain management, pathology, peripheral vascular disease, preventive medicine, pulmonary disease, radiation oncology, rheumatology, and urology; and the following surgical specialties: cardiac, colorectal, general, hand, maxillofacial, neuro, orthopedic, plastic/reconstructive, oncology, thoracic, and vascular.
5. These include only visits associated with outpatient treatment (not inpatient admissions or hospitalizations), namely, those with Current Procedural Terminology (CPT) codes for outpatient care for new/established patients (CPT 99201-99205, 99212-99215, 99241-99245, 99251-99255).
6. A potential omitted control variable which limits the measurement of SES is overall beneficiary wealth. However, given that retiree income is predominately composed of social security income and pensions (Poterba 2014), which are both functions of preretirement income, it is likely that wealth and income among retirees are highly correlated. This implies that this study's income measure can be interpreted as a proxy for overall net wealth. Supplementary analysis using the Health and Retirement Survey confirms the high degree of correlation between these variables.
7. For this study, the AMPGI is a weighted average of real geographically adjusted compensation for common CPT codes (CPT 99212-99215), relative to a hypothetical compensation measure that more accurately reflects practice costs. Details of this measures constructions are available upon request.
8. Complete regression coefficient results are available upon request.
9. For hospital and ER visits, adjusting the black distribution of SES results in a 1 percent point increase in the observed difference in probability and a 0.02 and 0.01 respective increase in volume.

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